TRAFFIC EVALUATION OF ALTERNATE TRANS CANADA HIGHWAY ROUTINGS

Prepared For:

New Brunswick Department of Transportation

July, 1990

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July 31, 1990

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Mr. Brian McEwing, P. Eng.
Assistant Director of Planning
Department of Transportation
P.O. Box 6000
Fredericton, NB
E3B 5H1

RE: TRAFFIC EVALUATION OF ALTERNATE TRANS CANADA HIGHWAY ROUTINGS

Dear Mr. McEwing:

I have enclosed our report relating to the above project. I trust the results will be helpful in your on-going efforts with respect to the upgrading of the Trans Canada Highway and connecting links through New Brunswick.

Yours truly,

Don Good

DON GOOD, P. ENG.
VICE-PRESIDENT

/rc

Encl.

TABLE OF CONTENTS

Chapter Number	Title	Page Number
1.0	INTRODUCTION	1
2.0	STUDY OBJECTIVE AND SCOPE	1
3.0	GENERAL APPROACH AND METHODOLOGY	2
4.0	SUMMARY OF RESULTS	3

1.0 INTRODUCTION

The majority of the effort for improving traffic flow and safety on the Trans Canada Highway through New Brunswick has been directed at upgrading Route 2 in the same existing general corridor through a combination of twinning and by-passing. The selection of the same general corridor was based on several reasons.

An earlier review of existing development along the Trans Canada Highway determined that there is the possibility to salvage approximately 40 percent of the existing alignment by twinning in areas where the impact on existing development would be minimal. There are other areas where development has reached a level that would make twinning both extremely disruptive and expensive. In these areas, which comprise approximately 60 percent of Route 2, by-pass options in the same general existing corridor are under consideration.

The current upgrading plans also recognize the traditional direct access the various communities along Route 2 have enjoyed over the years and the impacts eliminating this direct access might have on their individual economies. Current routing plans also take full advantage of construction phasing opportunities which would be available and recognize some new corridor segments could initially be completed as two lane highways since not all traffic will be diverted from the by-passed sections of Route 2.

Although current plans favour upgrading the Trans Canada Highway within the same general corridor, it is recognized alternate routes should be evaluated to ensure the best possible improvement plan is implemented. In addition, it should be noted that although planning is well advanced for some segments of the highway, there are some difficult areas, such as the link between Fredericton and Jemseg, in which alternate routing options require evaluation and a more detailed review. This report evaluates six other alternate routes and estimates the associated costs. These alternate routes include:

Route A - Fredericton to Moncton (North of Grand Lake)
Route B - Grand Falls to Moncton (Straight Line)
Route C - Grand Falls to Moncton (North of Penniac)
Route D - Hartland to Moncton (North of Penniac)
Route E - Woodstock to Moncton (With Connection to Fredericton)
Route F - Woodstock to Moncton (Without Connection to Fredericton)

2.0 STUDY OBJECTIVE AND SCOPE

A number of submissions opposing the current routing plans for the Trans Canada Highway upgrading, and suggesting alternate routes be considered, has been received by Government. This study has been completed to more fully assess various routing alternatives and, thus, address the

concerns of those opposing the current proposed routing plans. The following work activities have been completed:

1. Identify and assess possible alternative corridors for the Trans Canada Highway through the Province (including a straight line approach from Grand Falls directly to Moncton).

2. Estimate the anticipated traffic volumes (both truck and passenger vehicles) that would be diverted from the existing Trans Canada Highway and attracted to the alternate routes.

3. Analyze the short and long term impacts on level of service and safety along the existing Trans Canada Highway corridor for the various alternative routes.

4. Estimate order of magnitude costs associated with developing alternative routes, including any necessary connecting links.

5. Comment on the extent that the various alternative routes would serve the travelling public, provide access to both existing communities and new areas or communities along both the existing and proposed routes and the implications to the short and long term upgrading requirements along the existing Trans Canada Highway corridor.

3.0 GENERAL APPROACH AND METHODOLOGY

To evaluate the effectiveness of alternate routings on the existing Trans Canada Highway, it was first necessary to estimate the base year 1990 traffic volumes which would divert from the existing route. This was followed by a projection of the base year traffic volumes to the design year 2008. These volumes were then assigned to the alternate routes and a level of service and capacity analysis completed based on the traffic volumes remaining on the Trans Canada Highway and the volumes assigned to the alternate routes.

Three major data bases were utilized to estimate the traffic volumes which would divert. These include the traffic volumes collected annually on the provincial highway system, the Atlantic Provinces 1984 Truck Origin-Destination Survey and the 1979 New Brunswick Origin-Destination Travel Survey.

In selecting the annual growth rate to expand base year traffic volumes to the year 2008, two separate data sources were reviewed. These sources include forecasts produced by the Macroeconomic and Regional Analysis Branch of Transport Canada and the New Brunswick Department of Transportation annual traffic volume data base. In this study, automobile traffic is projected to increase annually by 2.7 percent, while truck traffic is expected to increase by 2.2

percent annually. A weighted average annual rate of 2.6 percent has been utilized to expand existing traffic volume estimates to 2008 traffic estimates.

The assignment of traffic to the various alternate routes represented a major effort, utilizing existing traffic volumes on the Trans Canada Highway and the two origin-destination surveys. The intent was to estimate the traffic volumes which would utilize the alternate routings and then to subtract the appropriate volumes from the existing Trans Canada Highway to determine the impact on level of service and upgrading requirements.

To assess the impacts of the alternate routings, a level of service analysis was completed along the Trans Canada Highway for 1990 traffic conditions and the design year (2008) traffic conditions, based on the volume of traffic diverted from the Trans Canada Highway to the alternate routes. Based on the level of service analysis for each of the alternatives, upgrading requirements were identified for specific highway segments along the Trans Canada Highway and the alternate routings. In some cases, the service life of two-lane segments can be extended beyond the design year as a result of an alternate route and thus require no upgrading. In other cases, many Trans Canada Highway segments still require upgrading to four lanes to accommodate design year traffic demand.

Order of magnitude costs were then developed for each alternate route, including any connecting links and upgrading requirements of the existing Trans Canada Highway.

4.0 SUMMARY OF RESULTS

Based on previous work completed with respect to utilizing the existing general corridor for upgrading the Trans Canada Highway, and efforts completed for this project at evaluating the six alternate routings, the following major results were identified.

1. Presently, the Trans Canada Highway functions in a number of roles which include serving commuters and local traffic, intra-provincial traffic movements, inter-provincial traffic to and from the Province and out-of-province traffic passing through the Province.

2. Traffic levels on the Trans Canada Highway have increased considerably since the system was designed. Present traffic levels (1988) on various highway segments range from a low of 3,310 to a high of 13,695 average annual daily vehicles, and commonly average between 5,000 to 8,000 vehicles per day. Design hourly volumes, a measure of average peak traffic, typically range between 700 and 1,200 vehicles per hour. Average truck traffic is approaching 20 percent of the total traffic, or in other words, one of every five vehicles on the highway is a truck. Automobile traffic is projected to increase by 70 percent and truck traffic by 55 percent over the next 20 years.

3. Presently, only 1.7 percent of the Trans Canada Highway is operating at level of service A and 4.1 percent at level of service C. These are acceptable levels of service, while anything lower indicates upgrading will be required. A total of 39.8 percent of Route 2 is at level of service D, 51.6 percent is at or near capacity (level of service E), while the remaining 2.8 percent is operating at level of service F.

4. Based on the projected traffic growth rates, over 98 percent of the Trans Canada Highway could be operating below level of service C by year 2008. At that rate, approximately 65 percent of the highway segments could be operating at a level of service E, at or near their capacities, while 32 percent of the highways could be at over-capacity level of service F.

5. The unit cost breakdown utilized in this report to estimate order of magnitude costs for upgrading the existing Trans Canada Highway and constructing the various alternate routes are shown below.

Costs (000's x 1990$)

Category	New Alignment (4 New Lanes)	Twinning (Additional 2 Lanes)
Interchange	3,850	2,750
Grade Separation	1,925	935
Bridge (per m^2)	2 to 3.3	2 to 3.3
Grading (per km)	880	440
Gravel (per km)	385	193
Paving (per km)	880	440

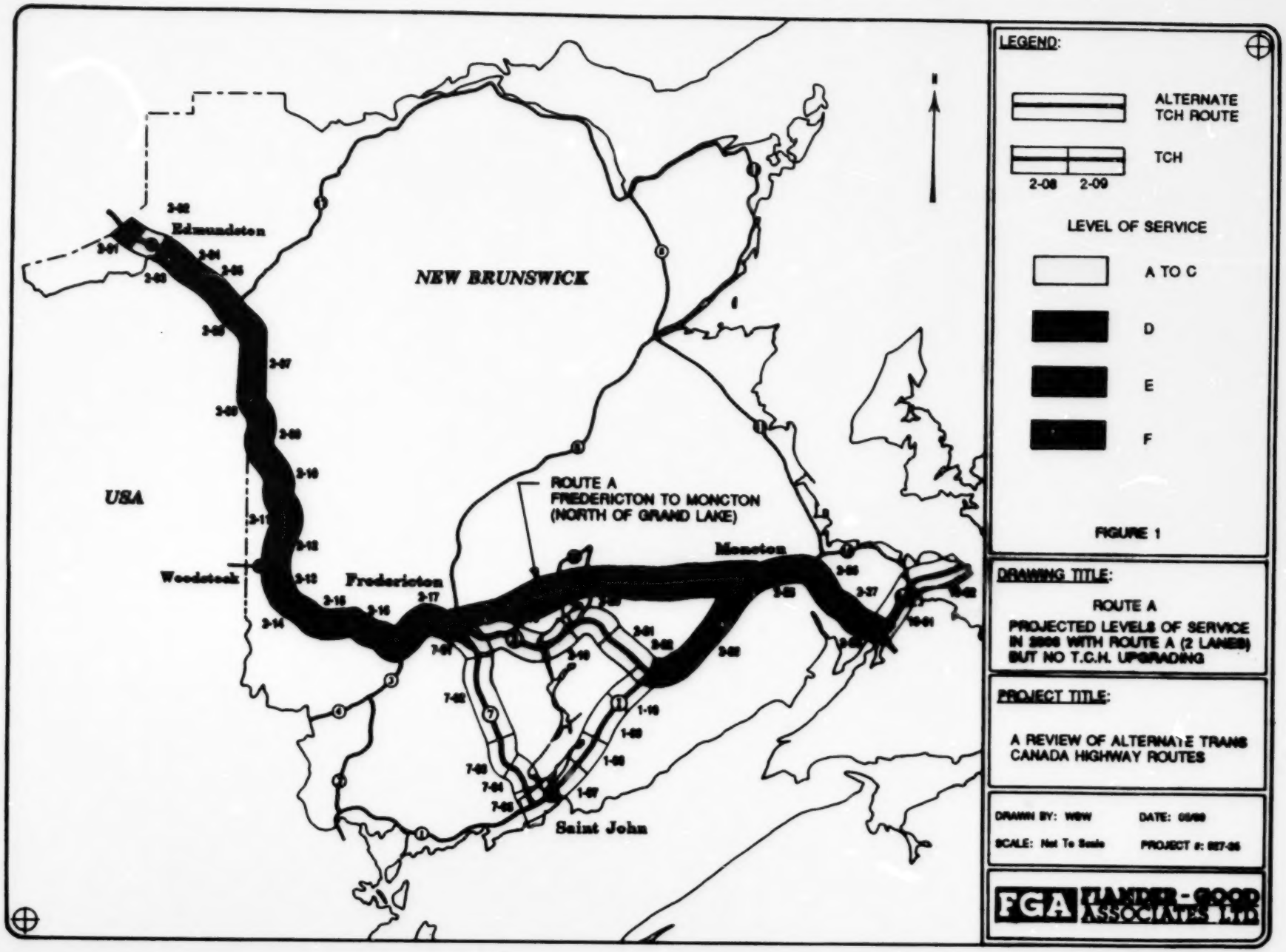
6. Table 1 summarizes the average annual daily traffic (AADT) volumes which can be expected to divert to each of the six alternate Trans Canada Highway routings if these routes were in place in 1990. Truck traffic volumes range between 13 and 20 percent of the AADT values.

7. If Route A were constructed as a two lane facility and no upgrading of the Trans Canada Highway was completed, then by the design year 2008, over three quarters of Route 2 would be operating below an acceptable level of service. As well, Route A would be experiencing level of service D operations by 1996. The projected level of service for the design year 2008 for the existing Trans Canada Highway and Route A is shown on Figure 1.

Table 1

ESTIMATES OF 1990 VOLUMES WHICH CAN BE EXPECTED
TO DIVERT FROM THE EXISTING TRANS CANADA HIGHWAY
TO THE ALTERNATE ROUTES

Alternate Route	Automobiles	Trucks	Total
Route A - Fredericton to Moncton (North of Grand Lake)	2,990	540	3,530
Route B - Grand Falls to Moncton (Straight Line)	1,260	255	1,515
Route C - Grand Falls to Moncton (North of Penniac)			
- Grand Falls to Fredericton	2,745	400	3,145
- Fredericton to Moncton	2,745	485	3,230
Route D - Hartland to Moncton (North of Penniac)			
- Hartland to Fredericton	3,140	460	3,600
- Fredericton to Moncton	2,745	485	3,230
Route E - Woodstock to Moncton (With Connection to Fredericton)			
- Woodstock to Fredericton	3,365	560	3,925
- Fredericton to Moncton	2,745	485	3,230
Route F - Woodstock to Moncton (Without Connection to Fredericton)	1,570	395	1,965


NEW BRUNSWICK
USA
Edmundston
Woodstock
Fredericton
Moncton
Saint John
ROUTE A
FREDERICTON TO MONCTON
(NORTH OF GRAND LAKE)
LEGEND:
ALTERNATE TCH ROUTE
TCH
2-08 2-09
LEVEL OF SERVICE
A TO C
D
E
F
FIGURE 1
DRAWING TITLE:
ROUTE A
PROJECTED LEVELS OF SERVICE IN 2006 WITH ROUTE A (2 LANES) BUT NO T.C.H. UPGRADING
PROJECT TITLE:
A REVIEW OF ALTERNATE TRANS CANADA HIGHWAY ROUTES
DRAWN BY: WDW
DATE: 05/89
SCALE: Not To Scale
PROJECT #: 027-05
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8. Figure 2 illustrates the projected 2008 level of service which would be experienced on the Trans Canada Highway and Route B (if constructed to two-lanes). This figure indicates over 96 percent of the Trans Canada Highway would be experiencing a level of service which is below an acceptable standard. Route B would continue to operate at level of service C or better throughout the design period.

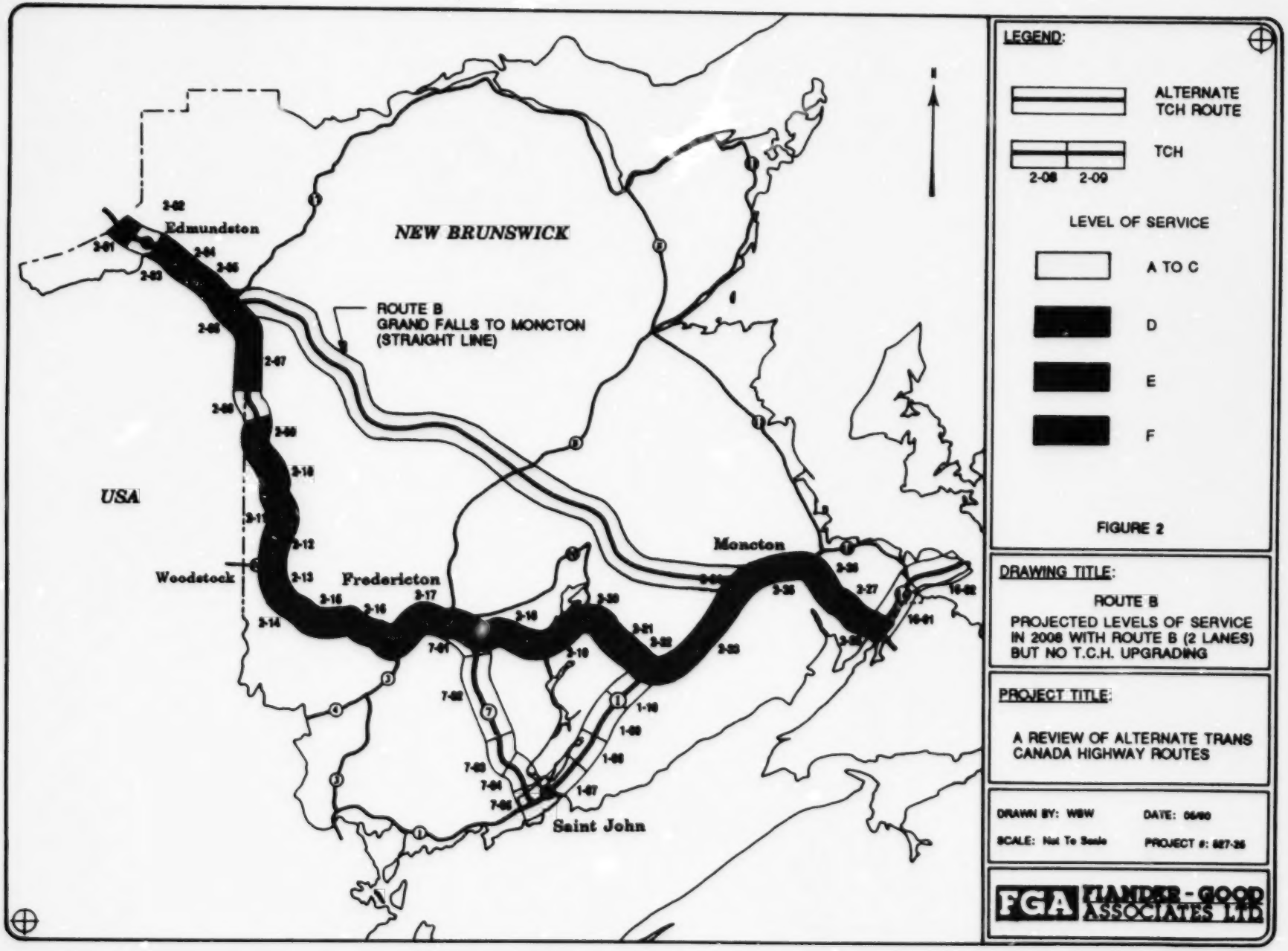
9. The effectiveness of Route C with respect to level of service on the Trans Canada Highway in the design year is shown in Figure 3. The analysis reveals that by 2008 almost 60 percent of Route 2 would continue to operate at level of service D or below. However, it should also be noted that if Route C were constructed as a two lane facility, it would begin to operate a level of service D by the year 2001.

10. With construction of Route D, as a two lane alternate route, 74 percent of the existing Trans Canada highway would operate at an unacceptable level of service by the design year 2008, if no upgrading were completed during this time frame. Figure 4 shows the projected level of service on Route 2 in 2008. It also shows that Route D would operate a level of service D. It has been estimated this level of service on Route D would first be experienced by 1996.

11. The projected design year level of service associated with Route E as a alternate route for the Trans Canada Highway is shown in Figure 5. The level of service analysis was based on no upgrading of the Trans Canada Highway and construction of Route E as a two lane facility. From Figure 5 it can be observed that almost 77 percent of the Trans Canada Highway would operate below an acceptable level of service. In addition, Route E would operate at level of service D by the design year 2008, with the Woodstock to Fredericton segment moving into level of service D by 1996 and the Fredericton to Moncton segment by the year 2000.

12. The final alternate route evaluated is referred to Route F and extends between Woodstock and Moncton with no connection to Fredericton. Figure 6 illustrates such an alternative would do very little to improving traffic flow operations on the existing Trans Canada Highway by the design year 2008. Although Route F would operate at an acceptable level of service throughout the design period as a two lane facility, no upgrading of the existing Trans Canada Highway would result in almost 98 percent operating below an acceptable level of service.

13. A cost estimate has been prepared for each of the six route alternatives, as well as the current routing proposal and these costs are expressed in 1990 dollars. The cost estimates are summarized in Table 2 and have been developed based on achieving an acceptable level of service on both the alternate routes and the existing Trans Canada Highway.


NEW BRUNSWICK
USA
Edmundston
Woodstock
Fredericton
Moncton
Saint John
ROUTE B
GRAND FALLS TO MONCTON
(STRAIGHT LINE)
LEGEND:
ALTERNATE TCH ROUTE
TCH
2-08 2-09
LEVEL OF SERVICE
A TO C
D
E
F
FIGURE 2
DRAWING TITLE:
ROUTE B
PROJECTED LEVELS OF SERVICE IN 2006 WITH ROUTE B (2 LANES) BUT NO T.C.H. UPGRADING
PROJECT TITLE:
A REVIEW OF ALTERNATE TRANS CANADA HIGHWAY ROUTES
DRAWN BY: WBW
DATE: 06/90
SCALE: Not To Scale
PROJECT #: 627-26
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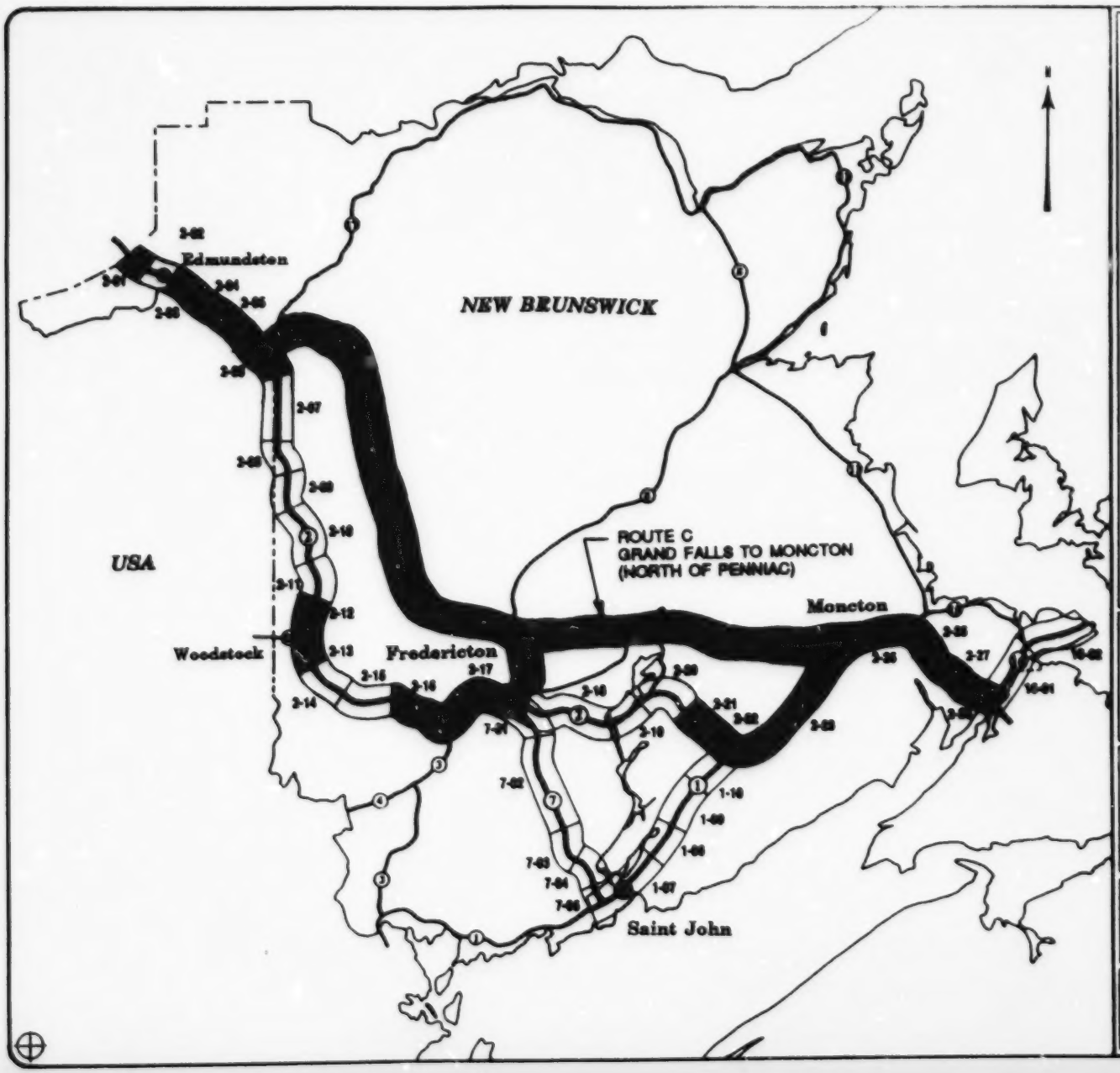

LEGEND:

ALTERNATE TCH ROUTE

TCH

2-08 2-09

LEVEL OF SERVICE

A TO C

D

E

F

FIGURE 3

DRAWING TITLE:

ROUTE C

PROJECTED LEVELS OF SERVICE IN 2008 WITH ROUTE C (2 LANES) BUT NO T.C.H. UPGRADING

PROJECT TITLE:

A REVIEW OF ALTERNATE TRANS CANADA HIGHWAY ROUTES

DRAWN BY: WBV/ DATE: 06/90

SCALE: Not To Scale PROJECT #: 627-26

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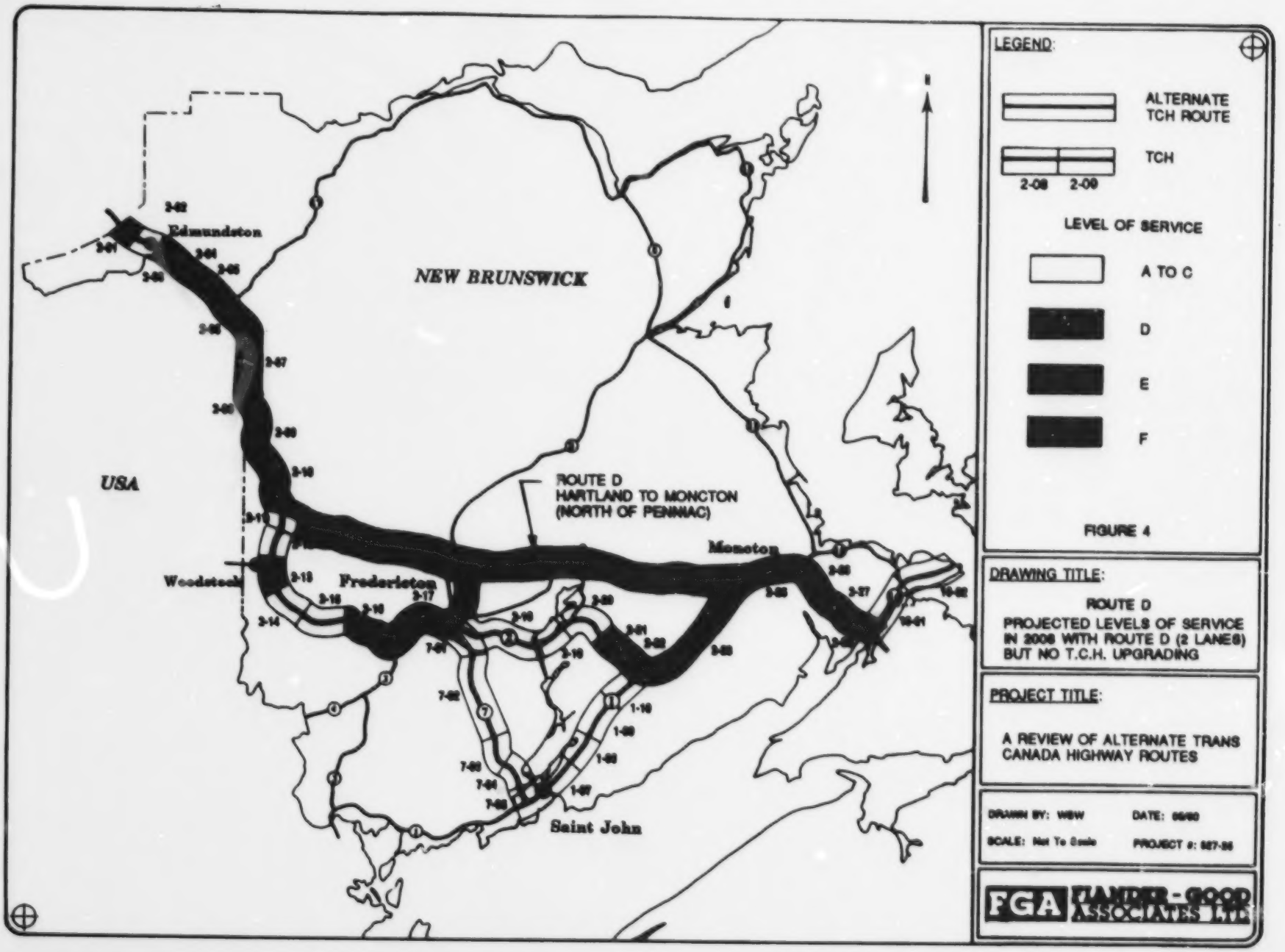
NEW BRUNSWICK
USA
Edmundston
Woodstock
Fredericton
Moncton
Saint John
ROUTE D
HARTLAND TO MONCTON
(NORTH OF PENNIAC)
LEGEND:
ALTERNATE TCH ROUTE
TCH
2-08 2-09
LEVEL OF SERVICE
A TO C
D
E
F
FIGURE 4
DRAWING TITLE:
ROUTE D
PROJECTED LEVELS OF SERVICE IN 2006 WITH ROUTE D (2 LANES) BUT NO T.C.H. UPGRADING
PROJECT TITLE:
A REVIEW OF ALTERNATE TRANS CANADA HIGHWAY ROUTES
DRAWN BY: WBW
DATE: 06/90
SCALE: Not To Scale
PROJECT #: 627-56
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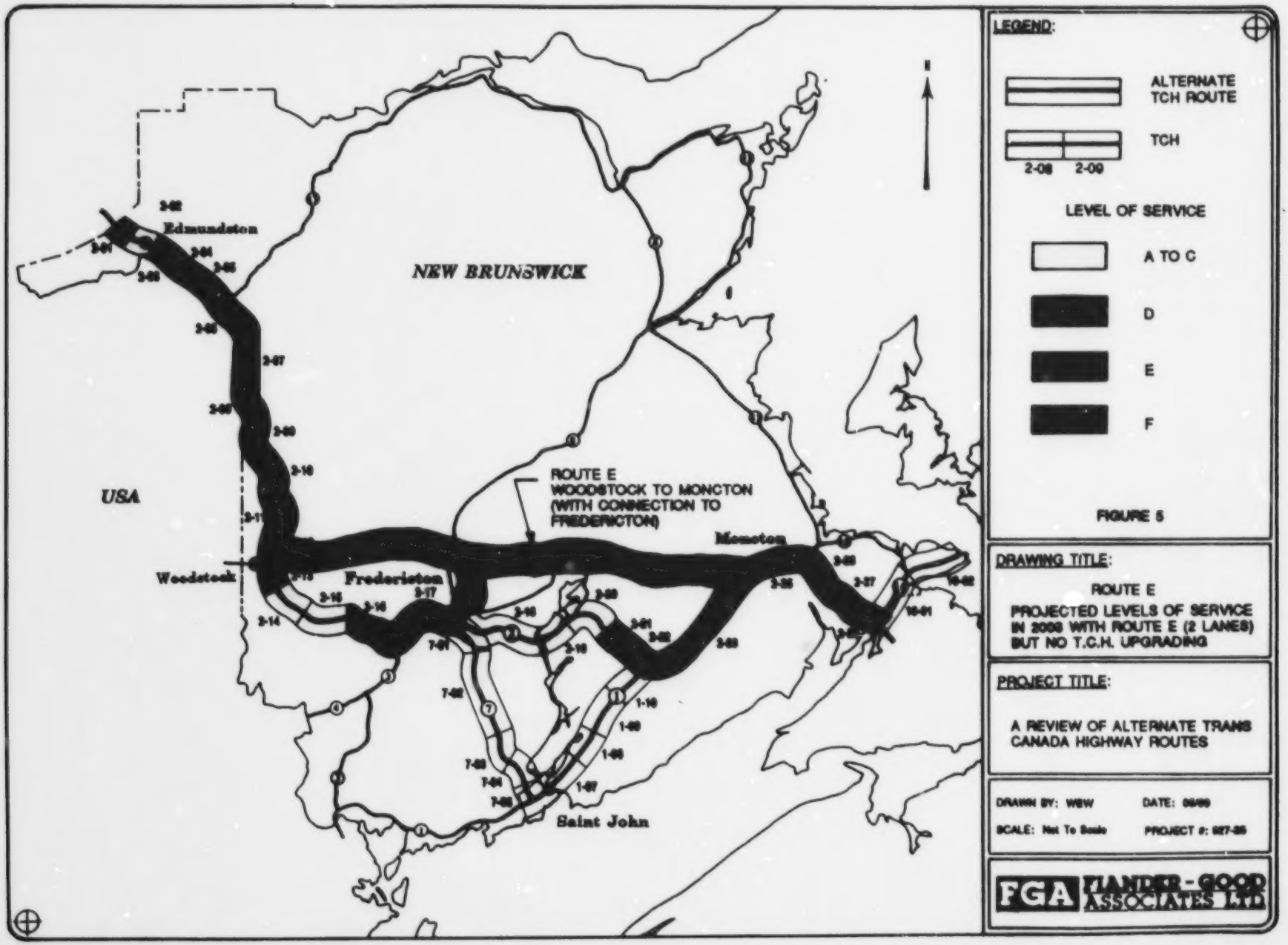
NEW BRUNSWICK
USA
Edmundston
Woodstock
Fredericton
Moncton
Saint John
ROUTE E
WOODSTOCK TO MONCTON
(WITH CONNECTION TO
FREDERICTON)
LEGEND:
ALTERNATE
TCH ROUTE
TCH
2-08 2-09
LEVEL OF SERVICE
A TO C
D
E
F
FIGURE 5
DRAWING TITLE:
ROUTE E
PROJECTED LEVELS OF SERVICE
IN 2008 WITH ROUTE E (2 LANES)
BUT NO T.C.H. UPGRADING
PROJECT TITLE:
A REVIEW OF ALTERNATE TRANS
CANADA HIGHWAY ROUTES
DRAWN BY: WBW
DATE: 06/99
SCALE: Not To Scale
PROJECT #: 827-05
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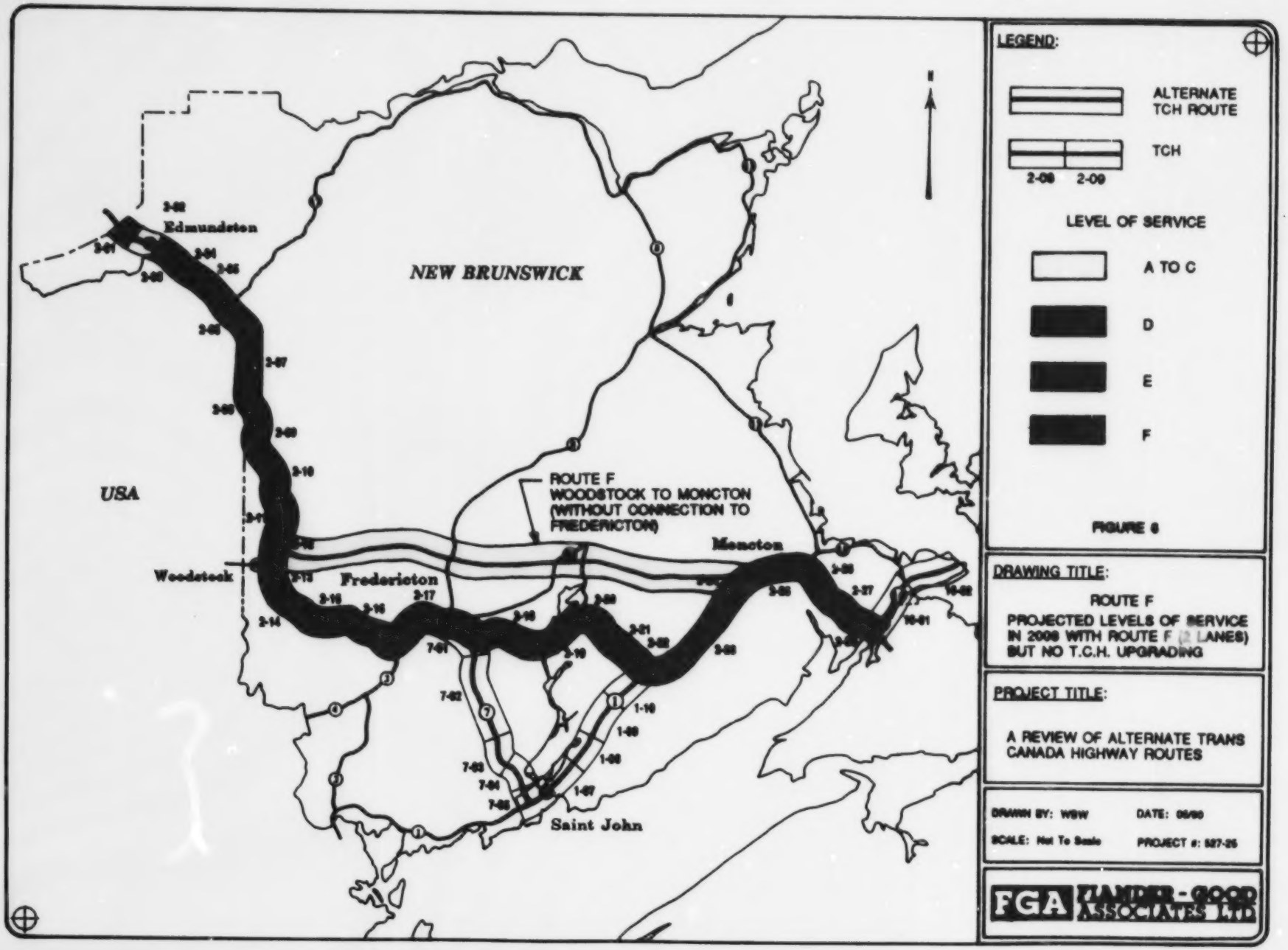
NEW BRUNSWICK
USA
Edmundston
Woodstock
Fredericton
Moncton
Saint John
ROUTE F
WOODSTOCK TO MONCTON
(WITHOUT CONNECTION TO
FREDERICTON)
LEGEND:
ALTERNATE
TCH ROUTE
TCH
2-08
2-09
LEVEL OF SERVICE
A TO C
D
E
F
FIGURE 6
DRAWING TITLE:
ROUTE F
PROJECTED LEVELS OF SERVICE
IN 2008 WITH ROUTE F (2 LANES)
BUT NO T.C.H. UPGRADING
PROJECT TITLE:
A REVIEW OF ALTERNATE TRANS
CANADA HIGHWAY ROUTES
DRAWN BY: WSW
DATE: 06/90
SCALE: Not To Scale
PROJECT #: 527-25
FGA
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Table 2

COST SUMMARY OF ALTERNATIVES TO ACHIEVE AN ACCEPTABLE LEVEL OF SERVICE BY YEAR 2008
(1990$)

Route Alternative	New Alignment	TCH Upgrading Requirement To Meet Deficiencies	Total
Upgrade TCH (Same General Corridor)	---	1,798,841	1,798,841
Route A - Fredericton to Moncton (North of Grand Lake)	684,290	1,269,506	1,953,796
Route B - Grand Falls to Moncton (Straight Line)	462,380	1,771,714	2,234,094
Route C - Grand Falls to Moncton (North of Penniac)	1,390,737	972,551	2,363,288
Route D - Hartland to Moncton (North of Penniac)	994,698	1,213,973	2,208,671
Route E - Woodstock to Moncton (with connection to Fredericton)	1,001,345	1,277,232	2,278,577
Route F - Woodstock to Moncton (without connection to Fredericton)	456,123	1,798,841	2,254,964

Reviewing Table 2, it can be observed that upgrading the Trans Canada Highway along the same general corridor to an acceptable level of service in the design year 2008 (ie. a four lane divided facility), would cost approximately 1.8 billion dollars.

The next best cost alternative is the construction of Route A as a four lane facility and upgrading the remaining deficiencies on the existing Trans Canada Highway. This is estimated to cost 1.95 billion dollars.

14. In addition to evaluating level of service and cost, a review of phasing opportunities, and other general considerations in relation to the alternate routes was completed. In general, because each of the six alternatives are not located near existing highways, very little phasing opportunities exist. For example, Route A, B and F would probably have to be completed in their entirely before any significant diversion of traffic from the existing Trans Canada Highway could be expected.

The remaining alternatives, Routes C, D, and E would probably have to be constructed in two separate segments, with Fredericton as the break point.

15. Although the six alternate routes would reduce the overall travel distance and time between the Quebec and Nova Scotia borders, for through province travel and divert traffic from the existing Trans Canada Highway to various degrees, these positive impacts are offset by other impacts.

The greatest negative impact of any of the alternate routings is their inability to significantly reduce the upgrading requirements of the existing Trans Canada Highway. Common to all alternatives is that the Sussex to Moncton link will require upgrading to four lanes. Other sections of the Trans Canada Highway would also require upgrading to four lanes.

Other impacts which should be considered when evaluating the effectiveness of the alternate routes include elimination of traditional access to communities along the Trans Canada Highway, reduction in tourism benefits for these communities and emergency type response to remote areas of the province.

16. Table 3 summarizes the number of lane - km associated with each of the six alternate routes and compares them with the current Trans Canada Highway routing proposal. The increase in lane - km ranges from 11 percent to 33 percent and this increase would have impacts with respect to increased maintenance and resurfacing costs.

Table 3

SUMMARY OF LANE-KM FOR THE
ALTERNATE TCH ROUTINGS

Alternate	Lane-km (km)
Current TCH Routing Proposal	2,741
Route A - Fredericton to Moncton (North of Grand Lake)	3,045
Route B - Grand Falls to Moncton (Straight Line)	3,283
Route C - Grand Falls to Moncton (North of Penniac)	3,645
Route D - Hartland to Moncton (North of Penniac)	3,370
Route E - Woodstock to Moncton (Connection to Fredericton)	3,388
Route F - Woodstock to Moncton (Without Connection to Fredericton)	3,148